Notes.

THE sixth International Congress of Mathematicians is being held this week at Strasbourg. It is eight years since the last congress was held at Cambridge, and it will be noted with regret that the then honorary president, Lord Rayleigh, and the president, Sir George Darwin, are no longer with us. The present meeting was fixed for this year at the Allied Conference of Scientific Societies held in Brussels in July, 1919; its organisation has been in the hands of the Comité National Français de Mathématique, of which M. Emile Picard is president, and of a local organising committee (president, M. Villat). On Wednesday, after the congress had been formally opened by M. Alapetite, Commissaire Général de la République, the members proceeded to elect their president and other officers. In the evening a reception was held by the organising committee in the Salle des Fêtes. In the course of the meeting lectures are being given by Sir Joseph Larmor (Thursday), Prof. L. E. Dickson (Friday), M. de la Vallée-Poussin (Saturday), M. Volterra (Tuesday morning next), and M. Nörlund (Tuesday afternoon). On Friday evening Gen. Tauflieb will give an address on "Science in Alsace." Conducted visits have been arranged to the cathedral and the museums, and excursions to the ports of Strasbourg and Kehl, to Saverne, and to Linge. At the end of the proceedings on Tuesday, September 28, the members will be entertained at a banquet kindly given by the organising committee. There is every prospect of a successful meeting, and it is anticipated that the members will have much of interest to communicate after being out of touch with each other for so long a period. On the eve of a new academic session English mathematicians are finding some difficulty in attending; only ten entries have so far been recorded from the United Kingdom.

SOME time ago the National Sea Fisheries Protection Association initiated a movement for the creation of a British Fisheries Society. A draft charter and by-laws have been prepared, and anyone interested in this matter can obtain a copy of the draft by-laws from Capt. G. C. L. Howell, Gadesprings, Hemel Hempstead. The proposal is to organise the society in two divisions, (1) industrial and (2) scientific, intelligence and general. Each division is organised in sections, fourteen in all, and these represent every interest in the fishery industry, producers, manufacturers, and distributors. Presumably the society as a whole will hold periodical meetings, and at these matters affecting the industry will be referred to the sections as committees. Proposals for a Journal, Transactions, and Proceedings, as well as for the institution of a library and museum, are outlined, and, in general, the objects of the society are to gather and diffuse information upon all matters relating to the fisheries and to unite all interests and affiliate the various bodies at present in existence. It is supported by a number of men very well known in the fishing industry.

WE have received notice of the forthcoming establishment in the University of Paris of an Institute of Psychology. The institute will be administered by a council composed of Profs. Delacroix, Dumas, Janet, Piéron, and Rabaud, and the Deans of the Faculty of Letters and Sciences. It will afford instruction, both theoretical and practical, in general, physiological, experimental, pathological, and comparative psychology. To it will be attached the recently established Institute of Pedagogy, forming its pedagogical section. Other sections of the institute, dealing with the general applications of psychology and with vocational selection, will be formed shortly. The institute will grant diplomas to successful students in each of these sections and to those who, after attending other courses of instruction, have passed the examinations therein. It will also be open for research work in connection with the University doctorate or higher diplomas. This union of Parisian psychologists can but strengthen the position of psychology in France. Previously Prof. Janet with his colleague, Prof. Dumas, worked in psychopathology quite independently of the late Alfred Binet, who directed the psychological laboratory. Prof. Piéron, Binet's successor, is now joining forces with the most famous representatives of French pathological psychology, and the institute thus formed is also to encourage the applications of psychology to education and to industry. The institute deserves to achieve success, and it has our best wishes.

A SUMMARY of the weather for the summer season, comprised by the thirteen weeks from May 30 to August 28, is given in the Weekly Weather Report of the Meteorological Office for the week ending August 28. The absolute highest shade temperature for the whole of the British Isles was 81° F. in Scotland E. and the Midland Counties, whilst in seven out of the twelve districts into which the country is divided the temperature failed to touch 80°, the highest temperature in England S.W. being 75° and in the English Channel 73°. Frost was registered in three of the five eastern districts. The mean temperature for the summer was below the average over the whole of the British Isles, the difference ranging from 0·5° F. in Scotland N. to 1·6° in one-half of the eastern and western districts. The essential feature of the summer was the persistent cool weather, and particularly the absence of warm days. At Greenwich the coldest of the three summer months was August, with a mean temperature of 58·7°, which is 4·2° below the average for seventy years, and there were only eleven days with the thermometer 70° or above against an average of twenty-one days. August of 1912 was slightly cooler, but this is the only exception since 1841. The mean temperature for the whole summer at Greenwich was 60°, which is 2° colder than the normal. The Meteorological Office record for the summer shows that the amount of rain was in excess of the normal except in Scotland N., England E., and Ireland. The greatest excess was 1·85 in. over the north-west of England and 1·77 in. over the south-east of England. The highest total fall was 11·77 in. for Scotland W., the least 6·25 in. for England E. July was generally the wettest summer month. The duration of bright sunshine was less than the normal except in Scotland N. and E.

The annual exhibition of the Royal Photographic Society is being held at the society's house, 35 Russell Square, W.C.1, and will remain open until the end of October. It is divided into three sections, namely, pictorial photographs, colour transparencies, and scientific and technical exhibits. The last is exceptionally rich in radiographic and astronomical photographs. Mr. Luboshez has a room to himself in which he shows several series of X-ray negatives on "Eastman duplitized film," made to find the methods of getting the best results in normal and adverse circumstances. The Sunic Research Laboratory shows radiographs of iron and steel welds, a carbon block, and a Palmer aero tyre, besides a "radiometallograph of thumb," which shows the lines and dots of the skin with great clearness. The other radiographs include a fine series by Dr. Robert Knox. The Astronomer Royal sends series of photographs of the total eclipse of the sun in 1919, the great sun-spot of March, 1920, and the new star in Cygnus. A number of fine photographs of the moon and two of the sun is contributed by the Mount Wilson Observatory. The research laboratory of the Eastman Kodak Co. sends some very interesting experimental results. There is a large number of natural history subjects. Some of the most notable are the president's coal-plant fossils; a tree in California which is supposed to be the oldest living thing, as it was a sturdy tree when Moses was a boy, contributed by the National Geographic Society of Washington; and Mr. Hugh Main's studies of the metamorphoses of beetles and other insects which take place underground, obtained by means of his "Subterrarium." Mr. Alfred E. Tonge sends sixty photomicrographs of the ova of British butterflies, including every genus as enumerated in "The Butterflies of the British Isles," and there are other photographs of entomological, botanical, geographical, zoological, and mathematical interest, besides some excellent aeroplane photographs by Capt. F. R. Logan.

The annual meeting of the British Mycological Society will be held at Minehead from September 27 to October 2. On Wednesday, September 29, Mr. T. Petch will deliver his presidential address on "Fungi Parasitic on Scale Insects." There will be excursions each day, and in the evenings of September 30 and October 1 the following papers will be read:—The Action of Gravity on the Fungi, Dr. Harold Wager; The Genus Ganoderma (Karst), Pat, Carleton Rea; The Mycorhiza of Orchids, J. Ramsbottom; The Audibility of the "Puffing" in the Larger Discomycetes, Prof. A. H. R. Buller; and The Sporulating Gonidia of *Evernia prunastri*, Ach., R. Paulson.

Prof. A. D. Waller, who went by a Handley Page open aeroplane to Brussels on Friday, September 10, has sent home the following notes, which are of interest as giving details of times, etc.:—"Started 2.45 p.m., arrived Brussels 4.40. Misty over London. England very puzzling. Thames distinct. 2·55.—Sea in sight. 3·15.—Left England. 3·20.—Lovely white coast; sun and steamers. Bar. 3000 ft., 95 m.p.h. 3·23.—Marvellous view of both coasts. 3·33.—Arrive France (Calais). 3·47.—Dunkerque. 3·55.—Nieuport and scarred battlefield zone. 4.2.—Dixmude. 4.16.—Ghent. 4·24.—Approaching Brussels. 4·32.—Brussels on horizon (3000 ft.). 4·34.—Are we visible? 4·40.—Gently land."

Mr. J. Hornell produces in the September issue of *Man* new evidence to prove the common origin of the outrigger canoes of Madagascar and East Africa. From these we have evidence of a remarkable case of culture transmission. It is now clear that the dominant Madagascar form is so closely related to that of North Java that we may regard them as identical. It follows, then, that the East African forms are all varieties of the Madagascar model, that the vertical stanchion design of African outriggers is more primitive than the oblique, and that the resemblance of this oblique form of stanchion to certain widely distributed Indonesian types of oblique connecting-joints (modified stanchions) in Bali, the Celebes, and the Moluccas is an instance of convergence and of independent origin.

The recently established Archæological Department in the dominions of his Exalted Highness the Nizam of Hyderabad is doing excellent service to the study of Indian antiquities. The report of the survey for 1917–18, recently issued, describes the progress made in the inspection of monuments. Every cave of the important Ajanta series is now in good order, and only some minor improvements remain to be made. In co-operation with Sir John Marshall, director of the Imperial Indian Survey, arrangements have been made to bring out an expert from Italy to examine the frescoes and to suggest measures to save them from further decay, while it is contemplated, under a scheme worked out by Sir John Marshall, in consultation with Sir Aurel Stein and M. Foucher, to have them reproduced by the three-colour process. Large collections of inscriptions have been made, and Mr. T. Srinivas, curator of the Hyderabad Museum, was deputed to inspect various other museums in India and to arrange for the exhibition of the Hyderabad collections. It is much to be desired that the other Native States in India, particularly those of Central India and Rajputana, should follow the example thus set by H.H. the Nizam of Hyderabad.

An address in memory of Pasteur's residence there was delivered at Strasbourg on July 26 by M. Calmette at the Congress of the French Association for the Advancement of Science. The subject was "Ultramicroscopic Micro-organisms." After a description of the salient features connected with many of these organisms, M. Calmette referred to the difficulty of obtaining filter-candles and membranes having a constant and homogeneous texture. Besides their invisibility and filterability, these ultramicroscopic organisms present certain common features. They are all destroyed at a comparatively low temperature and by weak solutions of most disinfectants. On the other hand, they maintain their vitality for a considerable time in pure glycerin. They are infectious only by direct contact or by inoculation, and never by water, air, soil, or fomites. The pathological lesions are also similar, and characterised by cell-"inclusions" and alterations of the cell-nuclei.

A TYPICAL instance of the deplorable methods of the "oologist" is given in the September issue of *British Birds* by Mr. Thomas Lewis, who set himself the task of recording the breeding habits of a colony of lesser terns newly established last year "on the southern part of the Norfolk coast." At one period there were more than forty nests on the beach. Then, on June 19, the colony "was almost completely destroyed by an egg-collector who swept three-fourths of the eggs, most of them far gone in incubation and some actually chipping, from the beach." Instances of this kind are, unhappily, far too common, and while this state of affairs continues the "oologists" can scarcely complain when they are reminded that between "egg-collecting" and scientific ornithology there is a wide gulf. This abominable raid made a complete survey of the breeding habits of this bird impossible; but the author fortunately succeeded in making a series of very valuable observations on the courtship and incubation periods, and in taking a number of remarkably fine photographs which accompany his essay.

THE latest report of the Industrial Fatigue Research Board (No. 8), by Messrs. S. Wyatt and H. C. Weston, is concerned with a preliminary study of some of the problems connected with bobbin-winding. The authors give a description of the conditions prevailing in the bobbin-winding department of a mill where the owners are enlightened enough to appreciate the value of attention to labour-saving devices and to the welfare of the workers. It was found that the conditions of labour were generally satisfactory except for the length of one of the working periods, which was of four and a half hours; such a period is probably too long for monotonous work, and might advisably be broken up by rest-pauses. The marked individual differences in efficiency which were noticed suggest that a more careful selection of the workers would be advantageous. The liability to accidents was very slight and the labour wastage almost negligible, so neither of these could be utilised as data for fatigue. In so far as it was possible to use output as an indication of fatigue, no signs of undue fatigue were evident, although the authors are very careful to emphasise the complex nature of the processes involved, and therefore the difficulty of taking such negative results as final. Although the data obtained do not permit of generalisation, yet it is clear that before confident conclusions on the fatigue resulting from industrial conditions can be reached, very many studies of this nature extending over years must be made in this and other trades, so that an abundance of evidence may be available as a foundation for future work. Such reports are valuable as correctives to the tendency, only too noticeable at the present time, to use science unscientifically.

MR. W. H. DALL, in reviewing "Pliocene and Pleistocene Fossils from Alaska" (U.S. Geol. Surv., Prof. Paper 125-C, 1920), points out that evidence accumulates against the view of a late Cainozoic bridge whereby land animals could cross in the Bering Strait region from Asia to America. The ice of glacial times afforded the only admissible means of communication. The Pliocene fossils of England and Iceland, investigated by Mr. F. W. Harmer, indicate a more free connection than now exists between the Bering Sea and North Atlantic waters.

THE older rocks of Mysore are receiving detailed study from the State Department of Mines and Geology. In the Records of this Department, vol. xvii., p. 67 (1920), Mr. B. Jayaram shows how some of the limestones of Mysore have originated from the alteration of calciferous igneous bands, while many actually replace quartz-felspar rocks of the granite and gneiss series. In Bulletin No. 9 (1920), Mr. P. S. Iyengar treats of the acid rocks of the State in general. As in so many areas, the gneisses have proved to be younger than a schistose series (here the Dharwars), the relations being those already pointed out by Drs. Smeeth and Fermor over a wider field. Mr. Iyengar is firm, and we think thoroughly justified, in his assertion that the Peninsular gneiss is an intrusive rock that has replaced the formation invaded by it.

"THE Use of the Panoramic Camera in Topographical Surveying," by Mr. J. W. Bagley, is a useful publication of the United States Geological Survey (Bulletin 657). In comparison with other methods of survey, the panoramic camera has certain advantages. Its use reduces very considerably the time required to be spent at each station in a plane-table survey. It follows that in the case of reconnaissance surveys a larger number of stations and so greater detail are possible with the help of a panoramic camera than without it. It is also found that with this camera and the plane-table the topographer is better equipped for country of both high and low relief than with the theodolite and plate-camera. Considerations of weight owing to the use of films instead of plates, and of cost as reflected in speedier work, are claimed to show other advantages. Full details are given of the camera and the methods of using it. The largest scale of surveys in which this camera has been used is 1 : 48,000, but this is by no means the limit of its use, which is decided by the degree of accuracy necessary in determining elevations—that is, roughly, by the contour interval. The bulletin also contains some useful notes on the application of photogrammetry to aerial surveys.

MESSRS. NEGRETTI AND ZAMBRA, of Holborn Viaduct, have issued a catalogue and price-list of meteorological instruments. The publication is well illustrated, and a detailed description is given of the several instruments. Each section is prefaced by an historical sketch of the separate branch of observation, which will prove of considerable interest to an observer, and supplies an easy method of valuable information being acquired. The catalogue in our hands is not complete, and is merely a compilation of some sectional lists; the paging shows how much is missing. In the sections for barometer and thermometer the lists do not give the self-recording instruments, although in rainfall and wind the registration instruments are fully dealt with. The section for deep-sea thermometers well illustrates the advantage secured by the long association of the optician with special scientific instruments; these thermometers have been carefully watched and improved by the maker for about half a century. Sunshine instruments of two recognised forms are well described and compared: the "Campbell-Stokes" recorder burns a trace on a time-divided card by the impinging of the sun's rays focussed through a sphere of glass; this system is generally adopted by the Meteorological Office. The other form is the "Jordan" recorder, in which a photograph of the rays of the sun is obtained upon a specially sensitised chart. The catalogue will be forwarded by Messrs. Negretti and Zambra to anyone who may be interested.

ACCORDING to an article by M. Jacques Boyer in *La Nature* for September 4, the aerotechnical institute of the Military Academy at Saint-Cyr has installed a pneumatic tank for experiments on the effects of reduced air-pressure and temperature on the physical powers of aviators. The tank in use up to the present time is 2 metres in diameter and nearly 4 metres long. It is of steel 5 mm. thick, and is insulated thermally by an outside layer of cork 10 cm. thick. Four glazed portholes are provided, through which the officer in charge can observe the aviator under test inside. Air-pumps and an air-refrigeration plant are provided, so that the pressure and temperature of the air in the tank can be varied at will. Oxygen tubes are also available, and the interior and exterior of the tank are in communication by telephone. By the help of this tank Dr. Garsaux has been able to study to what altitude aviators could ascend without losing their skill or injuring themselves, and at what stage of the ascent oxygen should be supplied. These altitudes differ according to the temperament of the aviator, but 6000 metres appears to be the limit for even the best men, and oxygen becomes necessary at 3500 or 4000 metres. Further observations are to be made with a larger tank.

A USEFUL account of the "synthetic" drugs is given by Prof. J. T. Hewitt in a series of Cantor lectures recently published (Journal of the Royal Society of Arts, August 13 and 20). Strictly, the phrase "synthetic drugs," implying as it does that the substances in question are produced artificially and find a use in medicine, would include many fairly simple compounds, such as chloroform; but in practice it is restricted to more or less complex carbon compounds which are either prepared by truly synthetic methods (*e.g.* veronal, phenacetin), or obtained by modifying the structure of naturally occurring compounds through chemical treatment. Thus morphine is converted into codeine (methyl morphine) or into heroin (diacetyl morphine) by appropriate chemical reactions. The lecturer classifies the various products according to their chemical relationships as derivatives of hydrocarbons, alcohols, ketones, and so on, thus obtaining a systematic survey of the various groups. The descriptions of the drugs are supplemented by outlines of the methods of manufacture, and in many instances include notes on the history and literature.

A SIMPLE form of thermo-electric pyrometer, mainly intended for use with electric resistance furnaces, has been placed on the market by the Automatic and Electric Furnaces, Ltd. The thermo-couple is composed of wires of nickel and nickel-chrome alloy, these metals being chosen owing to their resistance to oxidation at temperatures not exceeding 1000° C. The E.M.F. developed by this couple is only about one-half that furnished by a junction of iron and constantan, but is still sufficiently high to enable a pivoted indicator to be used. In order to avoid cold-junction errors, the leads to the indicator consist of the same materials as those of the thermo-couple—a procedure now followed generally in the case of base-metal junctions. In a leaflet issued by the firm an account is given of experiments performed with the view of determining the lag caused by the use of thick wires, and also that due to the use of a protecting sheath. The results show that notable errors may arise by assuming that a sheathed junction closely follows the changing temperature of a furnace, particularly when thick wires are used; and it is concluded that the wires should be as thin as possible—consistent with sufficient strength—and, when permissible, should be used uncovered. Two types of instrument are made: one with the junction unprotected, and intended for use in a clean atmosphere; and the other provided with a silica sheath for use in salt-baths, wires of No. 20 gauge being used in each. Both forms should prove useful for the class of work for which they are intended.

ARRANGED by the Institution of Petroleum Technologists, an interesting lecture on petroleum refining was given on September 8 by Dr. A. E. Dunstan. Crude petroleum is a very complex mixture of substances, which are most conveniently utilised if separated into groups (petrol, "white spirit," kerosene, fuel-oil, and so on) according to their volatility. One object of refining is to effect this separation; a second is to remove impurities, colour, and odour from the products. Probably in the future physico-chemical methods rather than purely chemical treatment will be relied upon for the removal of impurities. Sulphur compounds in particular are mentioned as substances which are adsorbed by passing oil distillates through a column of bauxite or fuller's earth, or, alternatively, by passing the vapour of the oil over heated bauxite. A fact not very generally known is that "toluol" (toluene), so urgently wanted in the war period, occurs naturally in certain varieties of crude petroleum, and "innumerable tons" of it were, indeed, obtained from this source. It is much purer than the toluol extracted from coal-tar, and the lecturer predicts a "future" for the aromatic hydrocarbons yielded by petroleum. Toluol can also be manufactured by "cracking" petroleum—that is, breaking down the more complex molecules into simpler ones by means of heat. This operation, which in its modern forms the lecturer dates back to a patent issued in 1890 to the late Sir Boverton Redwood and Sir James Dewar, is considered to be the most promising way of increasing supplies of petrol from petroleum sources.

Among points of interest in the report (Cmd. 881) of the Government Chemist on the work of his department during the past financial year we note that radium was extracted from many thousands of luminous dials, compass-cards, gun-sights, and similar materials made for use during the war. The extraction was complicated by the overwhelming proportion of paint with which the radium was mixed, but practically all was recovered and converted into a form suitable for further use at a comparatively small cost. For the Board of Trade 532 samples of the potash material supplied by Germany to this country were analysed. The samples taken were divided into three portions; one was analysed in Germany, another here, and the third retained in a neutral country for reference in case of dispute. The report, however, does not indicate whether any dispute actually arose. Incidentally, in connection with other samples, a method was worked out for differentiating between sodium chloride and potassium chloride in solid caustic potash. A good deal of work was done on the determination of the nature and proportion of the possible toxic constituents which might be present in water receiving drainage from tarred roads. In the course of this work new and delicate methods for detecting some of the substances were devised. Carbolic acid, for instance, can now be detected and estimated when present in even smaller proportion than one part in a million parts of water. The total number of samples, 368,898, dealt with during the year showed an increase of nearly 80,000 compared with the previous year. The principal increases were due to imported goods, such as wine, sugar, tea, and cocoa; they are indicative of the revival of trade after the return to peace conditions.

We have just received the Lincolnshire Naturalists' Union Transactions for 1919. The first portion of the volume is devoted to the annual reports of the sectional officers, recording, in most cases, the work which has been done during the past year in their own departments. The report from the botany section is somewhat different; it consists of notes selected from observations on seed-dispersal which have been made during the past fifty years by the sectional president and his colleagues. The methods adopted by birds for the transportation of seeds over long distances are mentioned, and the remainder of the report is given over to a list of the agents and methods by which the seeds of the commoner trees are dispersed. A complete list of the author's observations, which he promises to publish in a future volume, "The Flora of Lincolnshire," will be welcomed by ecologists. The volume also includes lists of marine shells of the Lincolnshire coast by Mr. A. Smith, and of non-marine mollusca of the county, contributed by Mr. J. W. Musham from data obtained from the manuscripts of the late Mr. W. J. Roebuck.

Our Astronomical Column.

ANOTHER QUICKLY MOVING DWARF STAR.—Mr. Innes's zeal in examining pairs of plates with the blink micrometer has been rewarded by the discovery of another very interesting dwarf star with a large proper motion and parallax. The former was detected from plates taken at Sydney, the latter from a series of fourteen plates taken at Johannesburg with the Franklin-Adams lens. The star is of the 12th magnitude; its position for 1920 is R.A. 11h. 12m. 52·39s., S. decl. 57° 8′ 13·1″; the proper motion in R.A. is −2·506″, in decl. +0·973″, total 2·688″ in P.A. 291·2°. The parallax from R.A. measures was found to be 0·350″, that from declination measures 0·324″.

The proper motion of α Centauri is 3·68″ in P.A. 281·4°. That of the present star is sufficiently near this to suggest that it may belong to the same system. Mr. Innes notes that if this were the case its parallax would be about 0·5″. It is not stated whether he took the radial velocity of α Centauri into account; in any case, the observed parallax is sufficiently near to render the assumption of connection tenable.

PROF. BARNARD'S OBSERVATIONS OF NOVA PERSEI.—Prof. Barnard puts the Yerkes refractor to good use in continuing to observe novæ long after they have become too faint for ordinary observers. The Monthly Notices, R.A.S., for June contains his observations of Nova Persei, 1901. Its light is still subject to fluctuations; thus it rose from 13·7 to 12·6 between 1919 November 15 and 18, declining again to 13·7 in the three following days. The mean value in 1920 is 13·48, and the progressive decline appears to have ceased. Unlike some other novæ, its aspect does not now differ from that of an ordinary star, and Prof. Barnard considers that it has returned very closely to its condition before the outburst. Micrometer measures of position appear to show a slight proper motion of the nova relatively to faint adjacent stars, the centennial displacement being 1·08″ in the direction of diminishing R.A. and 2·20″ S.

It is noted that the period required to decline to the pre-nova condition varies in different stars between eight and fifteen years, which is surprisingly short, considering the tremendous character of the outburst.

THE BERGEDORF OBSERVATORY, HAMBURG.—Vol. ii, Nos. 3–5, of the Abhandlungen of this observatory, which has just been issued, contains a useful catalogue of the positions, magnitudes, and colour-indices of the stars in the Pleiades (584 in number) down to mag. 14. The magnitudes were determined by observations with two wedge-photometers. Comparison with Hertzsprung's photographic catalogue shows that the visual magnitudes of the fainter stars are brighter in the mean by 0·7. The colour-indices increase rapidly from mags. 3 to 10, remaining fairly constant after this. Comparison is also made between the number of stars in each half-magnitude interval and the number to be expected in an average region of the same area in galactic latitude 23·7°, using the table of Van Rhijn. For stars brighter than mag. 11 the excess is more than threefold; it then gradually declines, reaching zero at mag. 13½. Another essay discusses the planetary observations made from 1909 to 1920. An interesting round dark spot on Jupiter had the abnormally large rotation period of 9h. 58·13m. from 1920, February 17 to March 18; it then split into two portions, one retaining the same rotation period, while the other had the value 9h. 53·5m., from observations between March 27 and April 1. There is also a study of the contour lines of equal luminosity in the Milky Way (north of decl. −25°). The brightest regions are between γ and β Cygni and in Sagittarius.